WHAT IS CLAIMED IS:

1. A cooling apparatus comprising:

a refrigerant tank for reserving a refrigerant to be boiled by heat of a heating body;

a radiator for releasing the heat of the vaporized refrigerant, as boiled in said refrigerant tank, to an external fluid; and

boiling area increasing means disposed in said refrigerant tank for defining the inside of said refrigerant tank into a plurality of vertically extending passage portions to increase the boiling area, the plurality of passage portions communicate with each other.

2. A cooling apparatus according to claim 1, wherein:

said boiling area increasing means includes first boiling area increasing member arranged on the lower side in said refrigerant tank and second boiling area increasing member arranged on the upper side; and

a plurality of first passage portions, which are defined by said first boiling area increasing member, and a plurality of second passage portions, which are defined by said second boiling area increasing member, communicate with each other in a horizontally staggered state.

3. A cooling apparatus according to claim 1, wherein:

said boiling area increasing means includes first boiling area increasing member arranged on the lower side in said refrigerant tank and second boiling area increasing member arranged on the upper side; and

said first boiling area increasing member and said second boiling area increasing member are arranged so that a space is retained therebetween.

4. A cooling apparatus according to claim 1, wherein:

said refrigerant tank is arranged generally in an upright position;

said boiling area increasing means includes a first boiling area increasing member arranged on the lower side in said refrigerant tank and a second boiling area increasing member arranged on the upper side; and

an average open area of the plurality of second passage portions, which are defined by said second boiling area increasing member, is made larger than that of the plurality of first passage portions, which are defined by said first boiling area increasing member.

5. A cooling apparatus according to claim 3, wherein:

third boiling area increasing member is arranged as

said boiling area increasing means in said space; and

third passage portion, which is defined by said third boiling area increasing member, is given an average open area larger than that of the first passage portion, which is defined by said first boiling area increasing member, and that of the second passage portion, which is defined by said second boiling area increasing member.

6. A cooling apparatus according to claim 1, wherein said boiling area increasing means includes corrugated fins to define said passage portion.

7. A cooling apparatus according to claim 6, wherein said corrugated fins have openings in their side faces.

8. A cooling apparatus according to claim 6, wherein louvers are cut up in the side faces of said corrugated fins.

9. A cooling apparatus according to claim 1, wherein said boiling area increasing means includes a boiling area enlarging member for enlarging the boiling area of a boiling portion, in which the refrigerant is boiled in said refrigerant tank by the heat of said heating body, by defining a boiling portion into passage shapes, and an average effective area of the passage-shaped portions defined by said member is made larger on the upper side than on the lower side in said refrigerant tank.

10. A cooling apparatus according to claim 9, wherein:

said boiling area enlarging member includes first corrugated fins having a larger pitch and second corrugated fins having a smaller pitch; and

said first corrugated fins are arranged on the upper side in said refrigerant tank whereas said second corrugated fins are arranged on the lower side in said refrigerant tank.

11. A cooling apparatus according to claim 10, wherein:

said first corrugated fins and said second corrugated fins individually have a plurality of openings in their fin walls; and

the openings of said first corrugated fins have a larger average effective area than that of the openings of said second corrugated fins.

12. A cooling apparatus according to claim 9, wherein:

said boiling area enlarging means includes a first plate-shaped member arranged on the upper side in said refrigerant tank to define the inside of said refrigerant tank vertically, and a second plate-shaped member arranged on the lower side in said refrigerant tank to define said refrigerant tank vertically; and

said first plate-shaped member and said second

plate-shaped member, there are individually formed a plurality of openings for the vaporized refrigerant to pass therethrough, of which the openings formed in said first plate-shaped member have a larger average effective area than that of the openings formed in said second plate-shaped member.

13. A cooling apparatus according to claim 12, wherein:

said first plate-shaped member and said second plate-shaped member are constructed of the wall faces of the corrugated fins arranged horizontally in said refrigerant tank; and

said openings are formed in the wall faces of said corrugated fins.

14. A cooling apparatus according to claim 9, wherein said refrigerant tank includes:

a refrigerant chamber for forming said boiling portion;

a liquid returning passage into which the condensed liquid liquefied in said radiator flows; and

a circulating passage for providing communication in a lower portion between said liquid returning passage and said refrigerant chamber.

15. A cooling apparatus according to claim 9, wherein said refrigerant tank is made of an extrusion member.

16. A cooling apparatus according to claim 1, further comprising:

air amount changing means for changing an amount of said cooling air to be provided to said radiator; and

detecting means for detecting one of a refrigerant tank temperature and a physical quantity relative to said refrigerant tank temperature,

wherein said air amount changing means decrease said amount of said cooling air to be provided to said radiator when a detected value of said detecting means is lower than a predetermined value.

17. A cooling apparatus comprising:

a refrigerant tank for reserving a refrigerant to be boiled by heat of a heating body;

a radiator for cooling a vaporized refrigerant in said refrigerant tank by a heat exchange with a cooling air;

air amount changing means for changing an amount of said cooling air to be provided to said radiator; and

detecting means for detecting one of a refrigerant tank temperature and a physical quantity relative to said refrigerant tank temperature,

wherein said air amount changing means decrease said amount of said cooling air to be provided to said radiator when a detected value of said detecting means is lower than a predetermined value.

18. A cooling apparatus according to claim 17, wherein said air amount changing means includes a cooling fan to generate the cooling air, and decreases a blowing air amount of said cooling fan when said detected value of said detecting means is lower than said predetermined value.

19. A cooling apparatus according to claim 17, further comprises a cooling air guiding passage to guide a moving air generated as a result of a movement of a vehicle to said radiator,

wherein said air amount changing means includes a cover plate which decrease a passage opening area of said cooling air guiding passage, and decreases said passage opening area of said cooling air guiding passage by said cover plate when said detected value of said detecting means is lower than said predetermined value.

20. A cooling apparatus according to claim 17, wherein said detecting means includes a temperature sensor to detect said refrigerant tank temperature.

21. A cooling apparatus according to claim 20, wherein said temperature sensor is provided at an adjacent region of said heating body to contact with said refrigerant tank.

22. A cooling apparatus according to claim 17, wherein said detecting means detects at least one of an air

temperature, a heating amount of said heating body, and said amount of said cooling air to be provided to said radiator, as said physical quantity relative to said refrigerant tank temperature.

23. A cooling apparatus comprising:

a refrigerant chamber for reserving a refrigerant to be boiled by heat of a heating body;

a vapor outlet from which a vaporized refrigerant boiled in said refrigerant chamber flows out;

a radiating portion having a refrigerant passage, into which the vaporized refrigerant having flown out from said vapor outlet flows, for cooling the vaporized refrigerant flowing through said refrigerant passage by the heat exchange with an external fluid;

a liquid inlet into which a condensed refrigerant cooled and liquefied in said radiating portion flows;

a circulating passage for circulating the condensed refrigerant from said liquid inlet to said refrigerant chamber;

a connecting tank disposed between said radiating portion, and said refrigerant chamber and said circulating passage for communicating between said refrigerant passage, and said refrigerant chamber and said circulating passage; and

refrigerant control means disposed in said connecting tank, for controlling flow of said condensed refrigerant dropped from said radiating portion.

24. A cooling apparatus according to claim 23, wherein said vapor outlet and said liquid inlet are opened in said connecting tank; and said refrigerant control means includes a structure that said liquid inlet is opened at a lower position than that of said vapor outlet.

25. A cooling apparatus according to claim 24, wherein:

said refrigerant chamber is thinned in a back-and-forth direction with respect to the width in a transverse direction and said heating body is attached to both or one of front and rear surfaces of said refrigerant chamber; and

said liquid inlet and said circulating passage are disposed on both sides of said refrigerant chamber.

26. A cooling apparatus according to claim 24, further comprising:

a refrigerant tank including said refrigerant chamber and said circulating passage therein and using the upper end opening of said refrigerant chamber as said vapor outlet and the upper end opening of said circulating passage as said liquid inlet,

wherein said refrigerant tank is attached at an inclination to said connecting tank; and in that the lowermost portion of said vapor outlet is positioned over the lowermost portion of said liquid inlet.

27. A cooling apparatus according to claim 26, wherein said refrigerant tank is constructed such that said vapor outlet is protruded more forward than said liquid inlet.

28. A cooling apparatus according to claim 27, wherein said refrigerant tank is constructed such that said vapor outlet is opened obliquely upward.

29. A cooling apparatus according to claim 26, wherein said refrigerant tank has a plug member to plug a lower side of said vapor outlet.

30. A cooling apparatus according to claim 26, wherein said refrigerant tank is made of an extrusion member.

31. A cooling apparatus according to claim 24, further comprising:

a refrigerant tank including said refrigerant chamber and said circulating passage therein;

a vapor tube having an opening portion opening into said connecting tank as said vapor outlet, and for providing communication between said refrigerant chamber and said connecting tank; and

a liquid returning tube having an opening portion opening into said connecting tank as said liquid inlet, and for providing communication between said circulating passage and said connecting tank.

32. A cooling apparatus according to claim 24, further comprising a refrigerant control plate covering said vapor outlet thereover in said connecting tank.

33. A cooling apparatus according to claim 23, wherein said connecting tank is disposed below said radiating portion and connected to an upper end portion of said refrigerant chamber, and an upper end portion of said refrigerant chamber is connected to said connecting tank with said refrigerant chamber inclining, and a part of an upper end opening that opens into said connecting tank is covered by a back flow prevention plate.

34. A cooling apparatus to be mounted on a vehicle comprising:

a refrigerant tank for reserving a refrigerant to be boiled by heat of a heating body;

a radiating portion for releasing the heat of a vaporized refrigerant boiled in said refrigerant tank to an external fluid; and

a connecting tank disposed below said radiating portion and connected to an upper end portion of said refrigerant tank, for connecting said refrigerant tank and said radiating portion,

wherein an upper end portion of said refrigerant tank is connected to said connecting tank with said refrigerant tank inclining, and a part of an upper end opening that opening into

said connecting tank is covered by a back flow prevention plate.

35. A cooling apparatus according to claim 34, wherein said refrigerant tank comprises:

a refrigerant chamber for reserving the refrigerant in accordance with a mounting surface for the heating body;

a vapor outlet from which a vaporized refrigerant boiled in said refrigerant chamber flows out;

a liquid inlet into which a condensed refrigerant cooled and liquefied in said radiating portion flows; and

a circulating passage for circulating the condensed refrigerant from said liquid inlet to said refrigerant chamber, and

wherein said vapor outlet and said liquid inlet are opened into said connecting tank as said upper end portion, and a part of said vapor outlet is covered by said back flow prevention plate.

36. A cooling apparatus according to claim 35, wherein said back flow prevention plate covers a lower side of said vapor outlet.

37. A cooling apparatus according to claim 35, wherein said back flow prevention plate has a plurality of small holes, and covers whole area of said vapor outlet.

38. A cooling apparatus according to claim 34, wherein said refrigerant tank comprises:

a refrigerant chamber for reserving the refrigerant in accordance with a mounting surface for the heating body;

a vapor outlet from which a vaporized refrigerant boiled in said refrigerant chamber flows out;

a liquid inlet into which a condensed refrigerant cooled and liquefied in said radiating portion flows; and

a circulating passage for circulating the condensed refrigerant from said liquid inlet to said refrigerant chamber, and

wherein said vapor outlet and said liquid inlet are opened into said connecting tank as said upper end portion, and a part of said liquid inlet is covered by said back flow prevention plate.

39. A cooling apparatus according to claim 38, wherein said back flow prevention plate covers an upper side of said liquid inlet.

40. A cooling apparatus according to claim 38, wherein said back flow prevention plate has a plurality of small holes, and covers whole area of said liquid inlet.

41. A cooling apparatus according to claim 34, wherein said radiating portion is inclined to a front side of said vehicle with respect to said connecting tank.

42. A cooling apparatus according to claim 23, wherein:

said vapor outlet and said liquid inlet are opened in said connecting tank, and

said refrigerant control means covers above said vapor outlet in said connecting tank, and forms a condensed refrigerant passage for guiding said condensed refrigerant from said radiating portion, which is dropped on an upper surface of said refrigerant control means to said liquid inlet.

43. A cooling apparatus according to claim 42, wherein said refrigerant chamber is thinned in a back-and-forth direction with respect to the width in a transverse direction and said heating body is attached to both or one of front and rear surfaces of said refrigerant chamber, and

said liquid inlet and said circulating passage are disposed on both sides of said refrigerant chamber.

44. A cooling apparatus according to claim 42, wherein said refrigerant control means forms said condensed refrigerant passage by lowering a center portion in a back-and-forth direction so that its sectional area is formed concave shape.

45. A cooling apparatus according to claim 42, wherein said refrigerant control means including a oblique surface in which a height of a center portion is highest in a

transverse direction, and is lowered toward to both peripheral portions in said transverse direction.

46. A cooling apparatus according to claim 23, wherein said refrigerant flow control means covers all over said refrigerant chamber so that the condensed liquid to drip from said radiating portion may flow into said liquid returning chamber, and forms said vapor outlet from which the vaporized refrigerant boiled in said refrigerant chamber flows out and which is opened transversely with respect to said radiating portion.

47. A cooling apparatus according to claim 46, wherein said liquid returning chamber is formed on the two sides of said refrigerant chamber.

48. A cooling apparatus according to claim 46, wherein said refrigerant control means includes one refrigerant control plate arranged all over said refrigerant chamber to form said vapor outlets individually below the two ends of said refrigerant control plate.

49. A cooling apparatus according to claim 46, wherein said refrigerant control means includes a plurality of refrigerant control plates covering partially over said refrigerant chamber and arranged to overlap partially vertically at stepwise different height positions to form said vapor outlets

between the vertically confronting refrigerant control plates.

50. A cooling apparatus according to claim 49, wherein said plurality of refrigerant control plates include:

a first refrigerant control plate positioned at an upper central portion of said refrigerant chamber and arranged at the highest position; and

a pair of second refrigerant control plates arranged on the two sides of said first refrigerant control plate for forming said vapor outlets between themselves and said first refrigerant control plate.

51. A cooling apparatus according to claim 49, wherein said plurality of refrigerant control plates, at least the refrigerant control plate arranged a low position is so inclined that the condensed liquid having dripped on the upper face of said control plate may easily flow toward said liquid returning chamber, and is bent further upward at the upper end portion of the inclination.

52. A cooling apparatus according to claim 23, wherein said refrigerant flow control means includes:

a side control plate for enclosing the upper end opening of said refrigerant chamber at a predetermined height;

an upper control plate for covering all over said refrigerant chamber enclosed by said side control plate; and

a vapor outlet for causing the vaporized refrigerant,

as boiled in said refrigerant chamber, to flow out; and

wherein said vapor outlet is opened at a higher position of said side control plate than the upper end face of said refrigerant chamber.

53. A cooling apparatus according to claim 52, wherein said liquid returning chamber is formed on the two sides of said refrigerant chamber.

54. A cooling apparatus according to claim 52, wherein said vapor outlet is opened in each of the faces of said side control plate.

55. A cooling apparatus according to claim 52, wherein said side control plate is inclined outward with respect to said refrigerant chamber.

56. A cooling apparatus according to claim 52, wherein said upper control plate has slopes which are the highest at their central portions and which are gradually lowered toward the two sides.

57. A cooling apparatus according to claim 52, wherein:

said upper control plate includes a first upper control plate and a second upper control plate individually covering partially over said refrigerant chamber; and

said first and second upper control plates are arranged

to overlap partially in the vertical direction at stepwise different positions, so that said vapor outlet is formed between said first and second upper control plates vertically confronting each other.

58. A cooling apparatus comprising:

a refrigerant tank having a smaller thickness size than a width size for reserving a refrigerant therein; and

a radiator for condensing and liquefying the vaporized refrigerant, as boiled by receiving the heat of a heating body in said refrigerant tank, by the heat exchange with an external fluid,

wherein said refrigerant tank is inclined at its two wall faces in the thickness direction at a predetermined direction from a vertical direction to a horizontal direction with respect to said radiator; said heating body is attached to the lower side wall face of said refrigerant tank in the thickness direction; and said refrigerant tank is formed into such a shape in at least its range, in which said heating body is attached, in its longitudinal direction that its thickness size becomes gradually larger as the closer to said radiator.

59. A cooling apparatus according to claim 58, wherein said refrigerant tank is generally horizontal at its lower side wall face to which said heating body is attached.

60. A cooling apparatus according to claim 58, wherein said refrigerant tank includes:

a refrigerant chamber for forming a boiling region in which the refrigerant reserved therein is boiled by receiving the heat of said heating body, and

a liquid returning passage into which the condensed liquid liquefied in said radiator flows; and

wherein said refrigerant chamber and said liquid returning passage are made to communicate with each other in the lower portion of said refrigerant tank.